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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,212	09/26/2006	Naruhisa Hirai	3273-0231PUS1	7227

2292 7590 12/18/2007
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EXAMINER

LAO, MARIALOUISA

ART UNIT	PAPER NUMBER
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1621

NOTIFICATION DATE	DELIVERY MODE
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12/18/2007

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary

Application No.

10/594,212

Applicant(s)

HIRAI ET AL.

Examiner

M. Louisa Lao

Art Unit

1621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9 is/are rejected.
- 7) ☒ Claim(s) 3 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 10/18/07 have been fully considered, as follows:
 - a. the objection to claims 4-6 and 8-10 under 37 CFR 1.75(c) are found persuasive.

The objection is withdrawn.

- b. the rejection of claims 1-7 and 9 under 35 U.S.C. 103(a) are not persuasive. The rejection is maintained, see below.

- c. the cancellation of claims 8 and 10 is acknowledged. The amendment of claim 1, incorporating the limitations of cancelled claims 8 and 10, is acknowledged. However, the oversight of non-inclusion of claim 10 in the Office Action mailed 7/19/07 was an oversight, and the rejection was meant to encompass claim 10, see below.

Claim Objections

2. Claim 3 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only, and/or, cannot depend from any other multiple dependent claim-. See MPEP § 608.01(n). However, in the interest of furthering the examination of the instant application, claim 3 has been treated on the merits.

Claim Rejections - 35 USC § 102

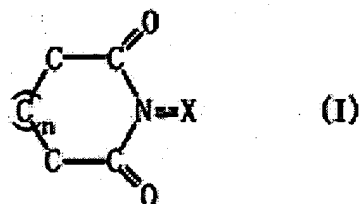
3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

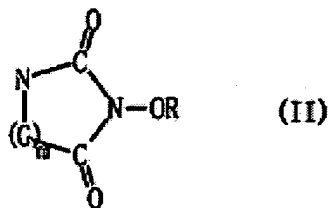
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-5, 7 and 9 rejected under 35 U.S.C. 102(b) as being anticipated by Ishii et al. (EP1459804, EP'804).

5. The instant claims are drawn to a method for producing an aromatic carboxylic acid, by oxidizing an aromatic compound B with oxygen in the presence of a catalytic nitrogen-containing cyclic compound A. The catalysts have a skeleton represented by formula (i) and

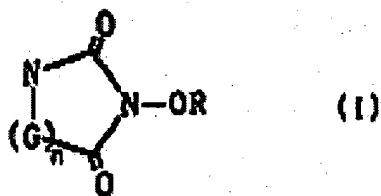


further, elucidated by Formula (I) and Formula (II), as shown



. The presence of a metallic compound promoter (like Co or Mn compounds), the quantity of catalyst (less than A), time of reaction of 0.5- 4 hours, temperature of 150°C and higher and a continuous feed and extraction using a plurality of reactors with B of 3.0%w or less at the most downstream reactor are recited.

6. EP'804 teaches the processes of the production of organic compounds with catalysts comprising cyclic acylurea compounds with the formula (I) as shown:



. In page 39 Examples 20-21, EP'804 teaches the conversion of p-xylene into terephthalic acid, at catalyst levels of 3-5% by mole relative to p-xylene, in the presence of a cobalt (II) acetate and manganese (II) acetate at 100-150 deg for 12-14 hours. EP'804 teaches in page 9 [0050] that the amount of metallic compound is 0.0001 to 10 moles relative to 1 mole of the cyclic acylurea compound. EP'804 teaches in page 12 [0126] that the reaction can be batch, semi-batch, continuous or another conventional system; where the addition of the cyclic acylurea compound catalyst to the reaction system in *installments*, effectuate to higher conversion or selectivity of the target compound. EP'804 teaches in page 12 [0127] that reaction products can be separated and purified by conventional techniques. EP'804 teaches in page 16 [0125] that the reaction temperature can be 20-200°C at reaction time of 10 minutes to 48 hours. EP'804 teaches that when oxygen-containing reactant is oxygen gas, it may be diluted with an inert gas (page 31 [0221]). EP'804 teaches in page 31 [0222] that the amount of oxygen can be varied depending on operability and can be 0.5 to 100 moles relative to non-Nitrogen containing compound/reactant. EP'804 typifies the reaction of an aromatic carboxylic acid in working examples, like Example 19 page 39 [0278], by the production of terephthalic acid at 100% conversion of p-xylene with its reaction with hexahydro-1,3,5-trihydroxy-1,3,5-triazine-2,4,6-trione, acetic acid, cobalt (II) acetate.4H₂O and manganese (II) acetate.4H₂O at 100°C in the presence of oxygen.

7. The continuous feeding of the catalytic nitrogen compound and continuous extraction of the reaction mixture from the reactor are inherent parameters in the reaction. It is well settled that a prior art reference may anticipate when the claim limitations not expressly found in that reference are nonetheless inherent in it. "Under the principle of inherency, if the prior art necessarily functions in accordance with, or includes, the claimed limitations, it anticipates." *MEHL/Biophile Int'l Corp. v. Miltraum*, 192 f.3d 1362, 1365, 52 USPQ2d 1303, 1305. Thus, the cited prior art reference reads on the instant claims.

Claim Rejections - 35 USC § 103

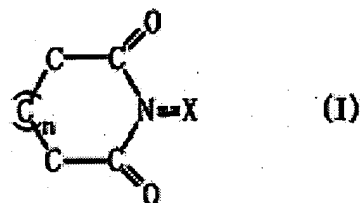
8. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

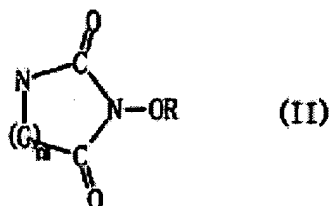
9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1-7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (EP1459804, EP'804) and Narihisa et al. (JP2003128618, JP'618) in view of Turner et al. (US6307099, US'099 *in IDS*).

11. The instant claims are drawn to a method for producing an aromatic carboxylic acid, by oxidizing an aromatic compound B with oxygen in the presence of a catalytic nitrogen-containing cyclic compound A. The catalysts have a skeleton represented by formula (i) and

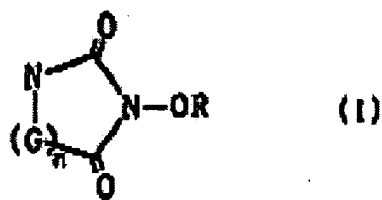


further, elucidated by Formula (I) and Formula (II), as shown



. The presence of a metallic compound promoter (like Co or Mn compounds), the quantity of catalyst (less than A), time of reaction of 0.5- 4 hours, temperature of 150°C and higher and a continuous feed and extraction using a plurality of reactors with B of 3.0%w or less at the most downstream reactor are recited.

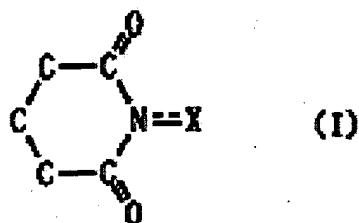
12. EP'804 teaches the processes of the production of organic compounds with catalysts comprising cyclic acylurea compounds with the formula (I) as shown:



. In page 39 Examples 20-21, EP'804 teaches the conversion of p-xylene into terephthalic acid, at catalyst levels of 3-5% by mole relative to p-xylene, in the presence of a cobalt (II) acetate and manganese (II) acetate at 100-150 deg for 12-14 hours. EP'804 teaches in page 9 [0050] that the amount of metallic compound is 0.0001 to 10 moles relative to 1 mole of the cyclic acylurea compound. EP'804 teaches in page 12 [0126] that the reaction can be batch, semi-batch, continuous or another conventional system; where the addition

of the cyclic acylurea compound catalyst to the reaction system in *installments*, effectuate to higher conversion or selectivity of the target compound. EP'804 teaches in page 12 [0127] that reaction products can be separated and purified by conventional techniques. EP'804 teaches in page 16 [0125] that the reaction temperature can be 20-200°C at reaction time of 10 minutes to 48 hours. EP'804 teaches that when oxygen-containing reactant is oxygen gas, it may be diluted with an inert gas (page 31 [0221]). EP'804 teaches in page 31 [0222] that the amount of oxygen can be varied depending on operability and can be 0.5 to 100 moles relative to non-Nitrogen containing compound/reactant. EP'804 typifies the reaction of an aromatic carboxylic acid in working examples, like Example 19 page 39 [0278], by the production of terephthalic acid at 100% conversion of p-xylene with its reaction with hexahydro-1,3,5-trihydroxy-1,3,5-triazine-2,4,6-trione, acetic acid, cobalt (II) acetate.4H₂O and manganese (II) acetate.4H₂O at 100°C in the presence of oxygen.

13. JP'618 teaches a method for producing aromatic carboxylic acids by oxidizing an aromatic compound having an aromatic ring linked with an alkyl group or its lower oxidized group with oxygen at 120 degC or more in the presence of a catalyst constituting an imide-based compound having a substituted N-cyclic imide skeleton shown by formula (I) below,



where X = an Oxygen atom or a hydroxyl group.

In [0057]-[0064], JP'618 typifies the conversion of acids from their corresponding aromatic hydrocarbons as illustrated by terephthalic acid from p-xylene reacting with oxygen in the

presence of the imide-based catalyst, the metal promoter cobaltous acetate and manganese acetate for 4 hours at 150degC. JP'618 in [0031] teaches that the amount of metallic compound is 0.0000001 to 0.1 mole relative to 1 mole of substrate.

14. The instant claims differ from EP'804 and JP'618 in the latter two's silence in the plurality of reactors used in the generation of the aromatic carboxylic acid or the level of the aromatic compound in most downstream reactor.

15. However, US'099 is relied upon to teach that a plurality of reactors or reactors in sequence in the production of terephthalic acid is known (column 1 lines 45-64).

16. Further, the differences of the instant claims from the cited prior art references are not patentable because at the time of Applicants' invention, one of ordinary skill in the art looking for a method of producing aromatic carboxylic acids from the reaction of the corresponding aromatic compound with oxygen in the presence of the acylurea or imide-containing catalyst with a Co/Mn metal compound promoters would have found it *prima facie* obvious to start with the teachings of the cited prior art references and couple said teachings with optimization steps, such as multiple reactors, as inferred from EP'804's teaching of *installment additions and the use of batch, semi-batch or continuous reactors*; or level of reactants and such as the level of aromatic compound, therein, to make Applicants' process using their methodology and parameters, thereto. The combination of the teachings of the cited prior art suggests that specific features of their invention may be combined with other features in accordance with the invention, and alternatively embodiments will be recognized by those skilled in the art and are intended to be included within the scope of the claims.

17. An artisan of ordinary skill in the art would have been motivated to modify the combined cited prior art processes, such as by optimization using multiple reactors or level of reactants therein, employing the concepts of conversion from batch (lab bench situations) to continuous reactions (suitable for manufacturing scenes), since these are within the purview of an artisan, with dictates of cost and availability of materials, through routine experimentation, to develop an optimized oxidation process with a reasonable expectation of producing aromatic carboxylic acids.

18. The recitation of multiple reactors or level of reactants therein, are optimization steps that are within the normal undertaking of one of ordinary skill in the art at the time of the invention and would not require any inordinate degree of experimentation.

Optimizing such processes is *prima facie* obvious because an ordinary artisan would be motivated to use known processes from the art to make the process more efficient or explore economical advantages over the other. Merely modifying the process conditions is not a patentable modification absent a showing of criticality. In re Aller, 220 F.2d 454, 105 U.S.P.Q. 233 (C.C.P.A. 1955).

In applying known technique to a known device (method, or product) ready for improvement to yield predictable results, The claim would have been obvious because a particular known technique was recognized as part of the ordinary capabilities of one skilled in the art.

The claim would have been obvious because "a person of ordinary skill has a good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product, not of innovation, but of ordinary skill and common sense.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MLouisa Lao whose telephone number is 571-272-9930. The examiner can normally be reached on Mondays to Thursdays from 8:00am to 8:00pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yvonne Eyler can be reached on 571-272-0871. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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MLouisa Lao
Examiner
Art Unit 1621

Yvonne Eyer
for YVONNE EYER
SUPERVISORY PATENT EXAMINER
TC1600 GAU 1621